CLAIMS

What is claimed is:

1. A signal processing system comprising:

a noise estimator operative to compute noise estimates for a plurality of data tones;

a beamformer operative to compute a first component of a constellation point estimate based at least in part on the noise estimates for the data tones and a second component of a constellation point estimate based at least in part on the noise estimate for the data tones, a ratio of the first and second components corresponding to the constellation point estimate; and

a slicer that iteratively computes a weighted constellation point estimate based on the first component, the second component and the noise estimates.

2. The signal processing system of claim 1, the slicer further comprising:

a hard slicer operative to iteratively compute hard decisions;

a weight determiner operative to iteratively compute weights for the hard decisions; and

an aggregator operative to combine the weights and the hard decisions into a weighted constellation point estimate.

3. The signal processing system of claim 2, the hard slicer computing the hard decisions as a function of the first component and the second component without a divide operation between the first and second components.

4. The signal processing system of claim 3, the weight determiner computing the weights based on the first component, the second component and the noise estimates for each respective data tone.

5. The signal processing system of claim 1, the slicer utilizing less than 11 divides per data tone.

6. The signal processing system of claim 1, the slicer utilizing a single divide per data tone.

7. The signal processing system of claim 1, the beamformer being operative to receive a plurality of data signals, a plurality of channel estimates and the noise estimates and to compute the first and second components for each respective data tone as a function of at least one of the data signals, at least one of the plurality of channel estimates and at least one of the noise estimates.

8. The signal processing system of claim 2 implemented as part of an application specific integrated circuit.

9. The signal processing system of claim 2 implemented as executable instructions programmed in a digital signal processor.

10. A soft slicer comprising:

a confidence determiner that iteratively calculates a number of confidence values as a function of a first component, a second component and a third component, a ratio of the first component and the second component defining a constellation point estimate and the third component being portions of noise estimates for a data tone;

a hard slicer that iteratively calculates a number of hard decisions as a function of confidence values as a function of the first component, and the second component, without performing a divide operation relative to the first and second components;

a weight determiner that iteratively computes a number of weight metrics as a function of the first component, the second component and the third component; and

an aggregator that combines each of the weight metrics with a respective hard decision to form a weighted constellation point estimate for each data tone.

11. The soft slicer of claim 10, the number of hard decisions being functionally related to a number of bits used to represent each constellation point estimate.

12. The soft slicer of claim 11, the number of hard decisions corresponding to a constellation point size for a received data signal.

13. The soft slicer of claim 10, the weight metrics being computed without performing more than one divide operation.

14. The soft slicer of claim 10, further comprising a noise determinant component that computes and stores an inverse of a determinant of a noise estimate.

15. The soft slicer of claim 14, the noise determinant component computing the determinant of the noise estimate as a function of the third component.

16. The soft slicer of claim 14, the inverse of the determinant of the noise estimate having a plurality of values, the noise determinant component computing and storing the inverse of the determinant at a decimated rate such that only a predetermined portion of the plurality of values of the inverse of the determinant is updated for a given data burst.

17. The soft slicer of claim 10, the first component being a numerator portion of a constellation point estimate and the second component being a denominator portion of the constellation point estimate.

18. The soft slicer of claim 10 implemented as part of a wireless communication system.

19. A wireless communications system, comprising:

a preprocessing system operative to process at least one received data burst and to convert the at least one received data burst into at least one digital signal in the frequency domain having a plurality of tones that comprise a plurality of data tones;

a noise estimator operative to estimate noise for the at least one preprocessed digital signal and provide an indication of estimated noise for the plurality of data tones;

a beamformer operative to perform beamforming computations for the plurality of data tones as a function of the indication of estimated noise, a plurality of first components and a plurality of second components, the first and second components for each data tone being portions of a constellation point estimate for each respective data tone; and

a soft slicer operative to perform slicing computations as a function of the plurality of noise estimates, the plurality of first components and the plurality of second components to compute a plurality of weighted constellation points without dividing the first and second components.

20. The communication system of claim 19, further comprising a data processor operative to detect and correct errors in the weighted constellation point estimates.

21. The communication system of claim 20, the data processor including a Viterbi decoder.

22. The communication system of claim 19, each of the weighted constellation point estimates is represented by at least two bits.

23. A signal processing system comprising:

beamforming means for computing a first component of a constellation point estimate for a data tone and a second component of the constellation point estimate; and

slicing means for computing a weighted constellation point for the data tone with less than two divide operations.

24. A wireless communication system comprising:

noise estimation means for estimating noise for a plurality of data tones of at least one received data signal;

beamforming means for performing beamforming computations for the plurality of data tones of the digital signal to provide first and second components of a constellation point estimate; and

slicing means for computing weighted constellation points for the plurality of data tones from the first and second components and a noise estimate.

25. A method comprising:

receiving a data signal having a plurality of data tones;

computing noise estimates for the plurality of data tones;

computing first and second components of constellation point estimates at least partially based on the noise estimates;

determining hard decisions as a function of the first and second components;

computing a weight for each hard decision as a function the first and second components and the noise estimates; and

combining the weights with the hard decisions to form weighted constellation point estimates.

26. The method of claim 25, the weight for each hard decision being computed as a function of the first and second components and an average of the noise estimates for each of the plurality of data tones.

27. The method of claim 25, the hard decisions being determined without utilizing a divide operation relative to the first and second components.

28. The method of claim 25, the weights being computed with less than 11 divide operations.

29. The method of claim 25, further comprising detecting and correcting errors in the weighted constellation point estimates.

30. The method of claim 25 implemented as part of a wireless communication system.

31. The method of claim 25, the noise estimates, the first and second components, the hard decisions and the weights being computed for each respective data tone.

32. The method of claim 25, the weight for each hard decision being computed as a function of the first and second components and an inverse of the determinant of the noise estimates, the inverse of the determinant having a plurality of values and being computed at a decimated rate such that only a predetermined portion of the plurality of values of the inverses of the determinant is updated for a given data burst.

33. A digital signal processor programmed to perform a method comprising:

receiving a data signal having a plurality of data tones;

computing noise estimates for each of the plurality of data tones;

computing first and second components of constellation point estimates as a function of the noise estimates for each respective data tone;

determining hard decisions as a function of the first and second components for each respective data tone;

computing a weight for each hard decision as a function of the respective first and second components and the respective noise estimates for each respective data tone; and

combining the weights with the hard decisions to form weighted constellation point estimates for each of the plurality of data tones.